oppose its spoliation, and everybody's business is proverbially nobody's. It is to be hoped, however, that the knell of these schemes was sounded on Monday last, when the House of Commons, on the motion of leading men of both parties, rejected the Chingford and High Beech Extension Bill, promoted by the Corporation and the Great Eastern Railway, by an overwhelming majority.

The House was fully aware that the line then proposed by Sir Thomas Chambers and Lord Claud Hamilton was only the first section of a longer one which would ultimately surround the Forest, and that it was intended to serve at first mainly as a feeder to another large tavern. All lovers of nature will rejoice that the collecting ground of Edward Forster, the Doubledays, and thousands of London naturalists less known to fame, has been rescued from destruction.

Authorities inform us that lopping and smoke have reduced the number of lichens and insects even during the last twenty years, and Conservatorial draining may have a similar effect upon other groups of organisms, so that the help of a railway in the work of devastation is certainly not required.

It is to be hoped that the verdict of Parliament will show the Conservators that forest management has a scientific basis and that their powers are not unlimited. It is equally desirable that the public interested in the Forest will form some organisation for its protection from encroachment and mismanagement in the future, so as to relieve a scientific body such as the Essex Field Club, which has borne the chief labour of opposition, from a task which, from its political and litigious character, must necessarily be uncongenial.

G. S. BOULGER

## *PERRY'S "PRACTICAL MECHANICS"*

*Practical Mechanics*. By John Perry, M.E. (London: Cassell, Petter, and Galpin, 1883.)

THIS book is one of a series of manuals now being published by Messrs. Cassell and Co., intended for the use of technical students, and claims, to quote the preface, "to put before non-mathematical readers a *method* of studying mechanics," which, if carefully followed, will supply "a mental training of a kind not inferior to that the belief in which retains in our schools the study of ancient classics and Euclid." A principal feature of the method consists in "proving" the various formulæ of mechanics by quantitative experiments. Of these many are described in the book, several of which, such as those relating to torsion and other stresses, &c., are carried on in many physical laboratories, and belong rather to physics than to mechanics. Another feature of the method more novel than the last is the gathering together of a few of the definitions and elementary theorems of mechanics, such as the parallelogram of forces, in a chapter at the end of the book called a glossary. Even then no formal proofs are given, probably because they are unnecessary, since on p. 2 we are told that the reader "cannot know the parallelogram of forces till he has proved the truth of the law half a dozen times experimentally with his own hands."

This kind of proof is very different from the evidence usually tendered for the fundamental laws of mechanics, but we must not forget the class of readers, entirely different as they seem to be from any we have ever encountered, for whom the book is intended. We are reminded of this on p. vii., when we are told that "the standpoint of an experienced workman in the nineteenth century is very different from that of an Alexandrian philosopher or of an English schoolboy, and many men who energetically begin the study of Euclid give it up after a year or two in disgust, because at the end they have only arrived at results which they knew experimentally long ago."

Thus the empire of the Greeks in geometry must give place to the supremacy of the intelligence of the working man, and even Euclid himself must fall from his high estate to be compared and contrasted with the modern schoolboy. But this latest born of time apparently possesses even higher powers. If made "to work in wood and metal," "to gain experience in the use of machines and use drawing instruments and scales," he will arrive at a condition in which "he may regard the 47th proposition of the First Book of Euclid as axiomatic," and "he may think the important propositions in the Sixth Book as easy to believe in as those in the First." Truly here at last has been found in geometry a royal road. But when Prof. Perry has raised our opinion of the modern schoolboy and working man to this high eminence we feel a rude shock on reading the second page of the book, when we discover that these rarely gifted, ideal beings, so favoured of the gods in geometry, may perhaps not be able to apply to a practical example a simple algebraical rule.

In reading the book, especially in its earlier chapters, we are struck by the want of logical arrangement and of strictness in the definitions, by the frequent use of terms which have not been previously defined, or not adequately defined, and of writing so careless in its style as frequently to become unintelligible. The theory of friction, in the limited extent to which alone it is given, is inserted piecemeal into parts of the two first chapters and into the glossary, and the ordinary laws are not explicitly given until nearly the end of the book, but in their place we have the loose statements, "friction is proportional to load," and "friction is a passive force, which always helps the weaker to produce a balance." The English of the last sentence is as curious in character as that of one on p. 13, "This rubbing is a very slow motion."

The doctrine of the conservation of energy or of the conversion of energy into heat is nowhere explicitly given, although the theory is assumed in numerous applications. Can it be that the modern schoolboy, duly equipped, is able not only to surpass Pythagoras by regarding the 47th proposition of Euclid as axiomatic, but that he has come to view the great physical theory as equally self-evident? It must be so; otherwise, having only been told of energy as the equivalent of mechanical work (p. 5), he would not understand the meaning of the obscure sentence—"Every experiment we can make shows that energy is indestructible, and consequently, if I give energy to a machine, and find that none remains in it, it must all have been given out by the machine."

We find the leading laws of hydrostatics inserted in a paragraph on water, which is included in the chapter on materials, fifty pages after the uniform transmission of fluid pressure has been assumed in the article on the

hydraulic press, and we are told (*note*, p. 75) that a cubic foot of water possesses, "in virtue of the steadiness of the motion, pressure or potential energy," &c. On p. 74 "total pressure" is used for resultant pressure. Nowhere throughout the book is the theory of the centre of gravity given, or the name even defined, yet the author—to the chagrin of any student who believes it—does not hesitate on p. 142 to preface with the words "it is evident" an application o he usual formulæ defining the position of the centre of gravity to the case in hand. The term "radius of g ration" is used on p. 144, but not defined until p. 196. The statement that "velocity is the speed with which a body moves" reminds one of Lord Palmerston's definition of an archdeacon, and we wonder what kind of notion will be gained of the motion of a body in a curve by any one who is told in a definition of centrifugal force that, "if a body is compelled to move in a curved path, it exerts a force directed outwards from the centre." We have also the following as a definition of the pitch circle :—"Two spur wheels enter some distance into one another, and the circle on one which touches a circle on the other, the diameters of these circles being proportional to the numbers of teeth on the wheels, is called the pitch circle." Could even the common sense of high quality, postulated of the readers of the book, enable them to select, from the infinite number of pairs of circles satisfying the above conditions, those which represent the pitch circles required?

In the rule for the differential pulley block we are surprised to find that the movable pulley rises through the whole, instead of half, the difference of the amounts of rope uncoiled from the two pulleys in the upper block. On p. 30 it is said :—"In the study of the motion of a slide valve it is much too usual to assume that the piston's motion is what is shown in Fig. 18 as pure harmonic motion." How shall we reconcile this with the information we have already received on the previous page that Fig. 18 (a skeleton drawing of a crank and connecting rod) does not represent pure (why not "simple?") harmonic motion except when the connecting rod is infinitely long?

In the rule which is inserted on p. 46 to find M, the constant should be twice that given, or about 59,500. On p. 64 our powers of comprehension are baffled in endeavouring to attach a meaning to the assurance that "50 foot-pounds is the total energy stored up in the wire *in the shape of a strain*." (The italics are ours.) In the rule given in Art. 192—we presume for *perfectly* elastic bodies—the momentum communicated from the one body to the other is just twice that stated.

We are told (p. 193) that the motion of a point in the balance of a watch is very nearly pure harmonic, if we suppose the point to move in a straight line instead of a circle, but we confess that the advantage of so describing the motion is not apparent, nor should we be disposed to call the friction in a twisted wire fluid friction (p. 199) because the friction in this case, as in that of fluids moving slowly, is proportional to the velocity.

The long array of mistakes given above, which by no means exhausts our list, forms a very serious accusation against the author.

His book has much disappointed us, for although some of the chapters, such as those on shear and twist, beams, graphical statics, and spiral springs, treat in a simple manner subjects which in parts present some difficulty, yet the defects to which we have alluded are far too grave to be compensated by any excellence in particular parts of the work. In the earlier chapters especially, the author has failed in the fundamental excellences of book-writing, in logical arrangement and clearness and exactness of expression, in just those qualities in fact in which he would have been most successful if he had aimed at writing more from "the standpoint of an Alexandrian philosopher." J. F. MAIN

## OUR BOOK SHELF

*Der Norske nord-hass-expedition*, 1876-1878. VIII. Zoologi, Mollusca. I. *Buccinidæ*, ved Herman Friele. Med 6 plancher og 1 kart. 4to. (Christiania: Gröndahl and Sons, 1882.)

I HAVE already, in the *Annals and Magazine of Natural History* for this month, given some account of the scientific expeditions which were made by the Norwegian Government during the years 1876, 1877, and 1878, to explore the sea-bed lying between the coasts of Western and Upper Norway and Iceland, Jan Mayen, and Spitzbergen; and I also noticed the series of publications which embody the result of these expeditions, including the present volume. I now propose to say a few more words on the subject of Herr Friele's work.

The great family of *Buccinum*, which is treated in it, is most perplexing in a taxonomical point of view; and its generic type, *Buccinum undatum*, is so unusually prolific and abundant, and consequently so variable, that no two conchologists agree as to the number of species belonging to it. In a short paper of mine on the northern species of *Buccinum*, which appeared in the *Annals* for December 1880, I ventured to consider as varieties of that species and of *B. grænlandicum* (which is probably also a variety of the polymorphous *B. undatum*) no fewer than 25 other so-called species. Such amalgamation will doubtless not be admitted by many conchologists; but the examination and careful comparison of an immense number of specimens from all parts of the North Atlantic which have fallen under my examination, warrant me in forming the above opinion. If we were to substitute the German word "geste'lt" or form for species, subspecies, and varieties, it might perhaps be a more safe and convenient mode of definition; but naturalists are not yet prepared to change the time-honoured system of Linnean and Lamarckian classification.

Herr Friele's work and the other publications to which I have referred are written in excellent English, as well as in his native language. The descriptions of new species are in Latin, which is scarcely so well adapted as English or French for the terminology of natural history at the present time; although his descriptions are far superior to the barbarous if not illiterate productions of Reeve and some other modern conchologists. The distinctive characters of new species are for the most part given in the same order, so that the description of one species can be more easily compared with that of a congener. This is an important and nearly indispensable desideratum. One new genus (*Jumala*) is proposed, having *Fusus Turtoni* for its type; and it appears to be based on Prof. G. O. Sars's description of the odontophore or dentition. Ten species are also for the first time described and figured, viz. one of *Jumala*, seven of *Neptunea*, and two of *Buccinum*. I regret that I must disagree with my friend the author as to the number of genera (six) into which he has divided the northern species of *Buccinidæ*. I should be disposed to attach more value to the operculum than to the odontophore as a generic character. Nor can I accept all his